



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/532,965	04/27/2005	Ja-Nam Ku	Q87567	9029
23373 7590 07/29/2008 SUGHRUE MION, PLLC 2100 PENNSYLVANIA AVENUE, N.W. SUITE 800 WASHINGTON, DC 20037				
EXAMINER STONER, KILEY SHAWN				
ART UNIT		PAPER NUMBER		
1793				
MAIL DATE		DELIVERY MODE		
07/29/2008		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/532,965

Applicant(s)

KU ET AL.

Examiner

KILEY STONER

Art Unit

1793

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 April 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 2 and 4-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 2 and 4-14 is/are rejected.
- 7) ☒ Claim(s) 1 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/CDC)
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____
- Paper No(s)/Mail Date: _____

DETAILED ACTION

Claim Objections

Claim 7 is objected to because of the following informalities: In line 1 it appears that "he" should be replaced with --the--. Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 5 and 7-8 are rejected under 35 U.S.C. 102(b) as being anticipated by Degani et al. (US 5,125,560) (hereafter Degani).

With respect to independent claim 1, Degani teaches a compression bonding method (abstract; column 2, line 64-column 3, line 12; and column 4, lines 16-30) comprising: disposing a plurality of metal bonding films in a pattern directly on a substrate made of a material selected from the group consisting of silicon and ceramic (Figure 1; and column 1, lines 16-17); and disposing bonded element above the plurality of metal bonding film shapes and applying heat to the substrate and pressure to the

bonded element, thereby bonding the bonded element to the substrate having the plurality of metal bonding film shapes, wherein the bonded element is plate shaped (Figure 1; column 2, line 64-column 3, line 12; and column 4, lines 16-30).

With respect to claim 5, Degani teaches the plurality of metal bonding film shapes are stripes or dots (Figure 1).

With respect to claim 7, Degani teaches that the heat is lower than 350°C (column 2, line 64-column 3, line 12; and column 4, lines 16-30).

With respect to claim 8, Degani teaches the bonded element contacts more than one of the plurality of metal bonding film shapes (Figure 1).

Claim 2 is rejected under 35 U.S.C. 102(b) as being anticipated by Desai et al. (US 5,170,931) (hereafter Desai).

With respect to independent claim 2, Desai teaches a compression bonding method (column 1, line 58; column 4, line 67; and column 7, lines 68-column 8, line 1) comprising: disposing a first plurality of metal bonding film shapes (12) in a pattern on a substrate (4) and disposing a second plurality of metal bonding film shapes (11) in a pattern on a bonded element (2); and disposing the bonded element (2) above the first plurality of metal bonding film shapes (12) and applying heat to the substrate and pressure to the bonded element (column 1, line 58; and column 4, line 67), thereby bonding the bonded element (4) having the second plurality of metal bonding film shapes (11) to the substrate (4) having the first plurality of metal bonding film shapes

(12), wherein the first plurality of metal bonding film shapes (12) are spaced apart from each other (note Figures 1A and 4).

Claim 2 is rejected under 35 U.S.C. 102(b) as being anticipated by Miyajima (JP 05-109977).

With respect to independent claim 2, Miyajima teaches a compression bonding method (abstract) comprising: disposing a first plurality of metal bonding film shapes (2) in a pattern on a substrate (B) and disposing a second plurality of metal bonding film shapes (5) in a pattern on a bonded element (A); and disposing the bonded element (A) above the first plurality of metal bonding film shapes (2) and applying heat to the substrate and pressure to the bonded element (abstract), thereby bonding the bonded element (A) having the second plurality of metal bonding film shapes (5) to the substrate (B) having the first plurality of metal bonding film shapes (2), wherein the first plurality of metal bonding film shapes (2) are spaced apart from each other (note Figures a, b and c).

Claims 2, 9-12, and 14 are rejected under 35 U.S.C. 102(e) as being anticipated by Jairazbhoy et al. (US 2002/0000331 A1) (hereafter Jairazbhoy).

Jairazbhoy teaches a compression bonding method comprising patterning bonding metal dots (16) on a metal substrate (80), disposing a second plurality of metal bonding film shapes (99) in a pattern on a bonded element (98), placing the bonding element above the bonding dots and applying heat to the substrate and pressure to the

Art Unit: 1793

bonded element (figure 12B and paragraphs 36, 37, 43 and 49). The dots comprise aluminum (paragraph 37). In an alternate embodiment metal dots (62) are patterned on a metal substrate (80) which is bonded to a metal sheet (10). See figure 1B and paragraph 30. It is the examiner's position that since the distance between the components is controlled by metal bumps (16) element (98) would have to be subjected to a downward force in order to obtain the proper standoff between the components being bonded. It should be further noted that gravity is pressing the element (98) downward.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 and 5-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Soga et al. (US 2006/0061974 A1) (hereafter Soga) as evidenced by Jochym.

Jochym is solely used in this rejection to establish that one of ordinary skill in the art considers Al_2O_3 a ceramic (note column 5, lines 22-25; and claim 18).

With respect to independent claim 1, Soga teaches a compression bonding method comprising disposing a plurality of metal bonding films (18) in a pattern directly on a substrate (13) made of a material selected from the group consisting of silicon and

Art Unit: 1793

ceramic (Al_2O_3 is considered a ceramic); and disposing a plate shaped bonded element (14) above the plurality of metal bonding film shapes and applying heat to the substrate and pressure to the bonded element, thereby bonding the bonded element to the substrate having the plurality of metal bonding film shapes, wherein the bonded element is plate shaped (Figure 7a and paragraphs 121 and 128-130). It should be noted that the pending claims are not limited to a substrate that only has one material layer. Furthermore, Figure 3 of Soga teaches a heater (15) that is placed below the substrate, and a tool (7), which presses on the Si chip. Thus, Figure 3 meets the limitations of the claimed thermocompression bonding process. It is clearly obvious to one of ordinary skill in the art that the elements 8, 18 and 29 of Figure 7A could be assembled by the thermocompression bonding method depicted in Figure 3. Thus, the claim would have been obvious because a particular known technique was recognized as part of the ordinary capabilities of one skilled in the art.

With respect to claim 5, Soga teaches that the plurality of metal bonding film shapes are stripes or dots (Figure 7A).

With respect to claim 6, Soga teaches that the bonded element is glass or metal (14, W-Cu plating).

With respect to claim 7, Soga teaches that bonding occurs at a temperature below 350 C (paragraphs 2-5 and 78).

With respect to claim 8, Soga teaches that the bonded element contacts more than one of the plurality of metal bonding film shapes (Figure 7A).

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Soga et al. (US 2006/0061974 A1) as applied to claim 1, and further in view of Jairazbhoy et al. (US 2002/0000331 A1).

The teachings of Soga et al. are the same as relied upon in the rejection of claim 1. However, Soga et al. does not specifically disclose a metal bonding film made of a material selected from the group consisting of aluminum, magnesium, zinc, and titanium. Jairazbhoy teaches a compression bonding method comprising patterning bonding metal dots (16) on a metal substrate (80), disposing a second bonding metal (99) on bonded element (98), placing the bonding element above the bonding dots and applying heat to the substrate and pressure to the bonded element (figure 12B and paragraphs 36, 37, 43 and 49). The dots comprise aluminum (paragraph 37). In an alternate embodiment metal dots (62) are patterned on a metal substrate (80) which is bonded to a metal sheet (10). See figure 1B and paragraph 30. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the invention of Soga et al. do include the metals disclosed by Jairazbhoy in order to control the ability of metals to clad together or plate onto each other and achieve desired relative reaction rates with known etchants (Jairazbhoy et al., [0037]).

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jairazbhoy et al. (US 2002/0000331 A1) as applied to claim 2, and further in view of Soga et al. (US 2006/0061974 A1).

The teachings of Jairazbhoy et al. are the same as relied upon in the rejection of claim 2. Although it is known in the art that processing temperature will be dependent upon the solder material used, neither is the solder disclosed nor a processing temperature taught. Soga teaches a compression bonding method comprising patterning bonding metal dots (18, 21) on a substrate (29) (figure 7a and paragraphs 121 and 128-130) wherein bonding occurs at a temperature below 350 C (paragraphs 2-5 and 78). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to employ conventional low temperature solders to promote strong, reliable bonds without damaging electronic components.

Response to Arguments

Applicant's arguments filed 4/18/08 have been fully considered but they are not persuasive.

The applicant argues that:

"The Examiner fails to address the arguments presented with regard to claim 2 in the Amendment filed October 31, 2005. Specifically, the examiner has failed to respond with any specificity to the argument that element 99 in Jairazbhoy is merely a solder joint created *after* the component is disposed atop the bumps 16. Thus, as noted on paged 6 on the Amendment, element 99 cannot be considered to be *in a pattern on a bonded element*."

The Office has no record of an Amendment filed on October 31, 2005; however, the applicant did file an amendment on October 31, 2007. It should be noted that the applicant's specification defines the bonded element as glass or metal, and the bonded element 35 may be an optical element made of glass or an electric element made of a

Art Unit: 1793

metal. The type, size, and shape of the bonded element 35 may vary (note paragraphs [0017] and [0031] of US 2006/0011705, respectively). As indicated by the pending rejection, the examiner considers #98 to be the "bonded element" and #99 to meet the limitations of a "second bonding metal". In view of the broadest reasonable interpretation it is the examiner's position that #99 of Jairazbhoy is disposed in a pattern on bonding element #98. The applicant is reminded of the "comprising" language of claim 2. The transitional phrase "comprising" is inclusive or open-ended and does not exclude additional, unrecited elements or method steps. See, e.g., *Invitrogen Corp v. Biocrest Mfg., L.P.*, 327 F.3d 1364, 1368, 66 USPQ2d 1631, 1634 (Fed. Cir. 2003) ("The transition 'comprising' in a method indicates that the claim is open-ended and allows for additional steps.") Accordingly, the examiner maintains the position that joint #99 meets the limitations of the claimed "second bonding metal".

The applicant further argues that:

"In FIG 3 of Soga discloses the W-Cu plating (14) is directly formed on the substrate (13) and in FIG 7(a) of Soga discloses solder bumps (18) is disposed between Si substrate (29) and Si chip (8). Thus, Soga does not disclose solder bump (18) is disposed between the substrate (13) and the W-Cu plating (14)."

As stated by the examiner in the Advisory Action mailed on 9/5/07:

"It should be noted that Figure 7A and paragraphs [0121] and [0128]-[0130] are relied upon by the examiner to meet the limitation of disposing a plurality of metal bonding film shapes directly on a substrate. In the instant rejection the examiner is not relying on Figure 3 to teach disposing a plurality of metal bonding film shapes directly on a substrate. However, with respect to Figure 3 it is the examiner's position that the W-Cu plating (#14) and the Al₂O₃ base (#13) meet the limitations of the claimed substrate. The pending claims are not limited to a substrate that only has

one material layer. Furthermore, Figure 3 of Soga teaches a heater (#15) that is placed below the substrate, and a tool (#7), which presses on the Si chip. Thus, Figure 3 meets the limitations of the claimed thermocompression bonding process. Clearly the elements of #8, #18 and #29 of Figure 7A could be assembled by the thermocompression bonding method depicted in Figure 3." (emphasis added by the examiner).

Reference #18 in Soga meets the limitation of the claimed "plurality of metal bonding film shapes". Thus, the claim would have been obvious because a particular known technique was recognized as part of the ordinary capabilities of one skilled in the art. The examiner reminds the applicant that during patent examination, the pending claims must be "given the broadest reasonable interpretation." Applicant always has the opportunity to amend the claims during prosecution, and broad interpretation by the examiner reduces the possibility that the claim, once issued, will be interpreted more broadly than is justified. *In re Prater*, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-51 (CCPA 1969).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kiley Stoner whose telephone number is 571-272-1183. The examiner can normally be reached Monday-Thursday (9:30 a.m. to 8:00 p.m.).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jessica Ward can be reached on 571-272-1223. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent

Art Unit: 1793

Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kiley Stoner/

Primary Examiner, Art Unit 1793